

Identifying the effects of physical environment features on burglary and controlling demographic and socio-economic variables

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Environment and Burglary

- Environment Features and Burglary
- Previous Research
 - Defensible Space(Newman,1973)
 - Social housing projects of Brownsville and Van Dyke, in New York(considered similar in social terms)
- Critiques—not adequate control for the interaction of demographic and socio-economic variables
 - it is difficult to find reliable and comparable “twin” areas in the real world (Armitage,1999 and Brown,1999)

Research Question

- What kinds of environmental variables affect burglary occurrence, controlling for certain socioeconomic and demographic characteristics ?

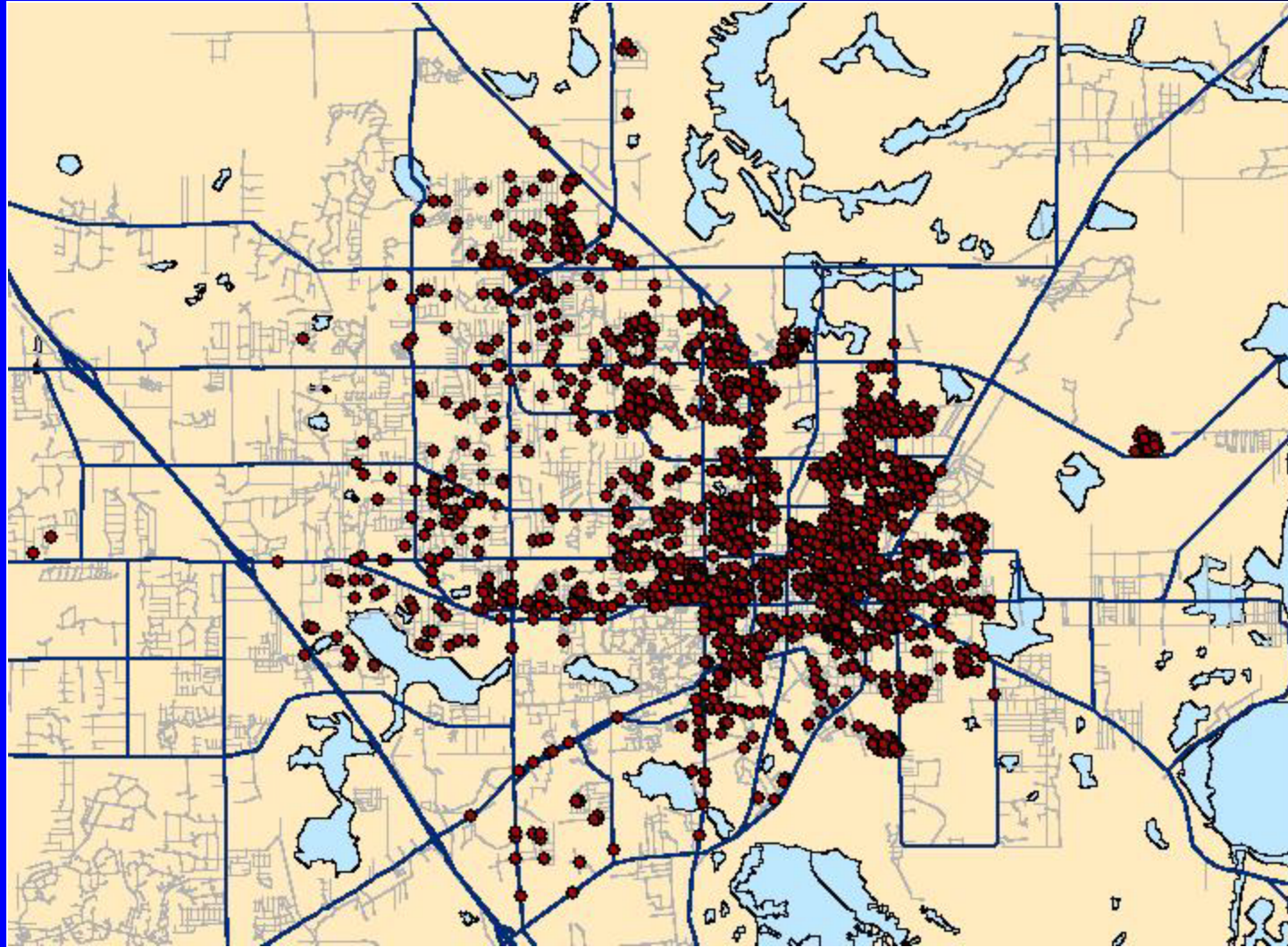
Research Methodology

- Identify significant demographic and socio-economic variables
- Identify matched sites of burglarized sites with similar demographic and social-economic variables
- Analyze environmental features of sample sites and controlled match sites

Study Area

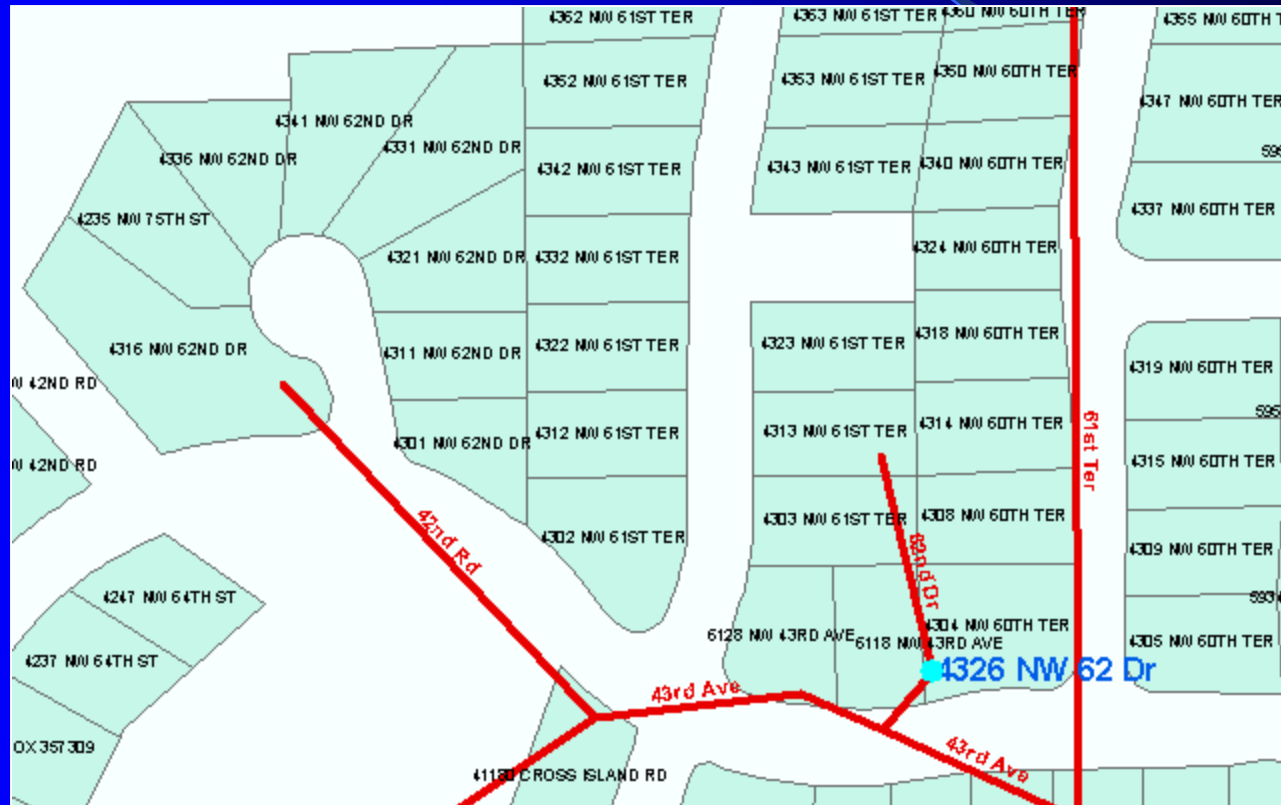
- Single family residential burglary in Gainesville , FL
 - Based on calls for service data from Gainesville Police Department
 - From Jan 2000 to Dec 2002
 - Total Count of Burglaries: 7462
 - Residential Burglary: 1893 unique addresses out of 2659 cases
 - Based on geocoding and address standardization, 737 single family parcels are identified with recorded residential burglary cases, approximately 40% of the unique addresses

Residential Burglary in Gainesville

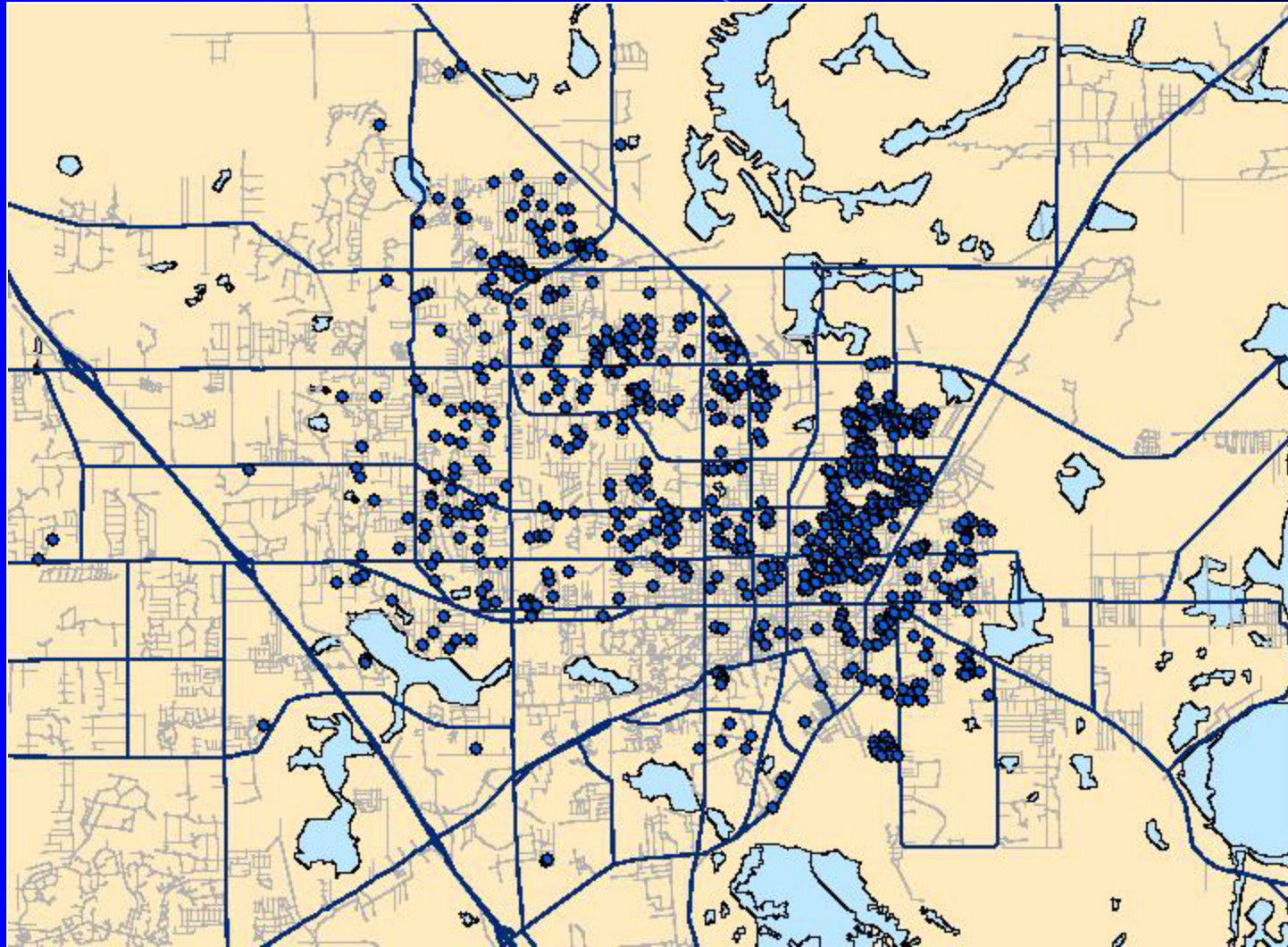


Geocoded by street data, (2000-2002), 1893 unique addresses, 1800 of them can be matched by geocoding.

Identify Burglarized Single Family Parcels

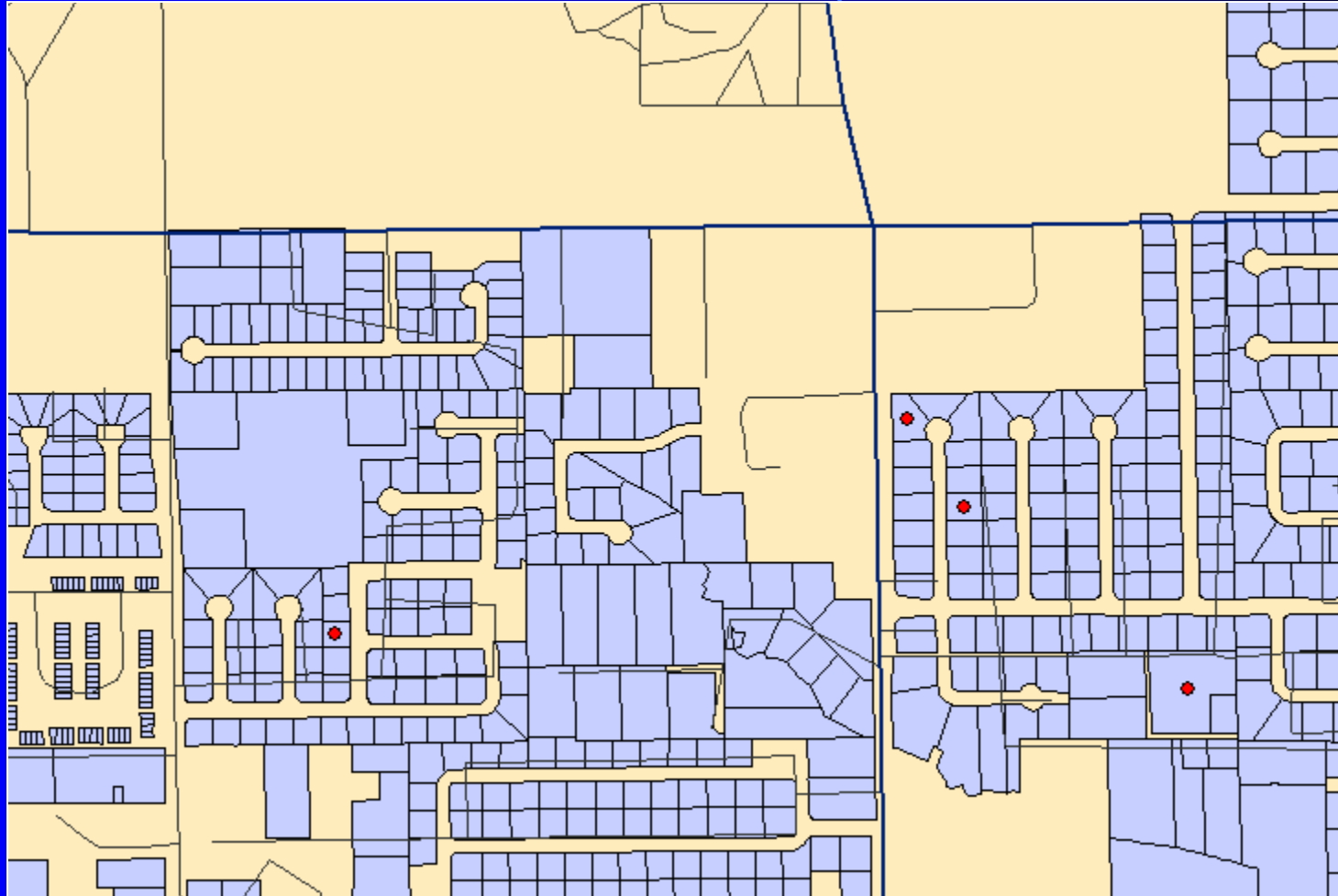


Burglarized Single Family Parcels



737 parcels(2000-2002),validated by parcel address

Burglarized Single Family Parcels



Crime Factors (FBI, 2002)

- Population density and degree of urbanization
 - Variations in composition of the population, particularly youth concentration
 - Stability of population with respect to residents' mobility, commuting patterns, and transient factors
 - Economic conditions, including median income, poverty level, and job availability
 - Cultural factors and educational, recreational, and religious characteristics
 - Family conditions with respect to divorce and family cohesiveness
 - Modes of transportation and highway system
 - Climate
 - Effective strength of law enforcement agencies
 - Administrative and investigative emphases of law enforcement
 - Policies of other components of the criminal justice system (i.e., prosecutorial, judicial, correctional, and probational)
 - Citizens' attitudes toward crime
 - Crime reporting practices of the citizenry
- (http://www.fbi.gov/ucr/cius_02/html/web/crimefactors.html)

Some Potential Demographic and Socio-economic Factors Related to Burglary

- Population Density
- Age Composition
- Gender Composition
- Ethnicity Composition
- Stability of Population
- Economic Conditions
- Household Composition

Independent Demographic and Socio-economic Variables

- Population Density:
 - POPDENS: population density
- Age Composition:
 - PCT_17: percentage of 7-17 years
 - PCT_21: percentage of 18-21 years
 - PCT_29: percentage of 21-29 years
- Gender Composition:
 - PCT_Male: percentage of male
- Age Gender Composition
 - MED_AGE_M: median age males
 - MED_AGE_F: median age females
- Ethnicity Composition :
 - PCTMNRTY: percentage of minority
- Stability of Population:
 - PCTRENTY: percentage of housing units renter occupied
- Economic Conditions
 - AVG_ASSD_V : average value of single family's assessed value
- Household Composition:
 - PCTHLD1M: percentage of 1-person household male householder
 - PCTHLD1F: percentage of 1-person household female householder
 - PCTMARCH: percentage of family households married-couple family w/ own children under 18 yrs
 - PCTMARNOC: percentage of family households married-couple family no own children under 18 yrs
 - PCTMHHC: percentage of family households other family male householder no wife w/own children under 18 yrs
 - PCTMHHC: percentage of family households other family female householder no wife w/own children under 18 yrs
 - AVE_FAM_SZ: average family size
- Source: Census Tract data,2000

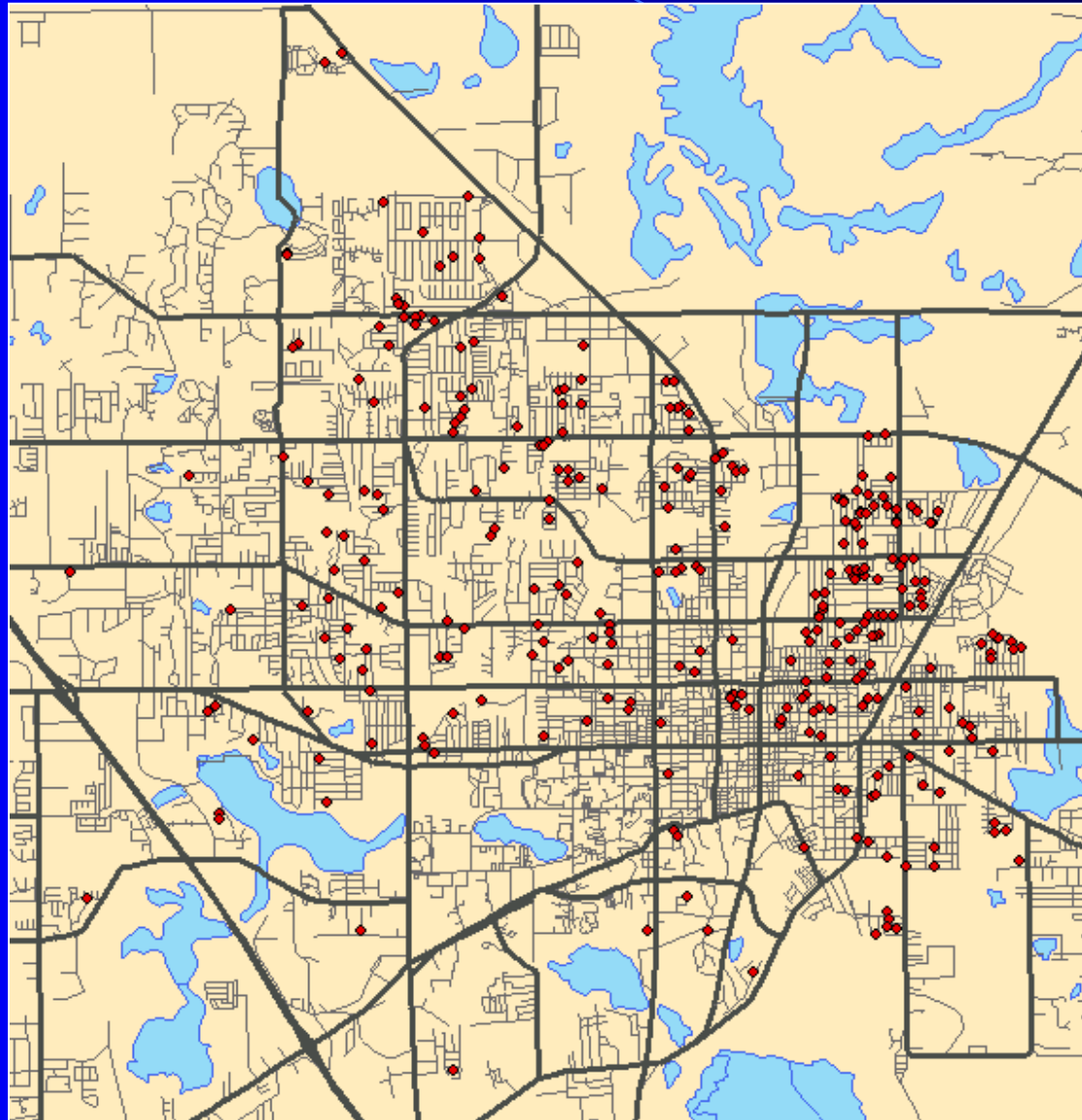
Significant Demographic and Social-economic Variables

(stepwise linear regression analysis for data in Gainesville, 2000-2002)

- Population Density:
 - POPDENS: population density
- Age Composition:
 - PCT_29: percentage of 21-29 years
- Age Gender Composition
 - MED_AGE_M: median age males
 - MED_AGE_F: median age females
- Economic Conditions
 - AVG_ASSD_V : average value of single family's assessed value
- Household Composition:
 - AVE_FAM_SZ: average family size

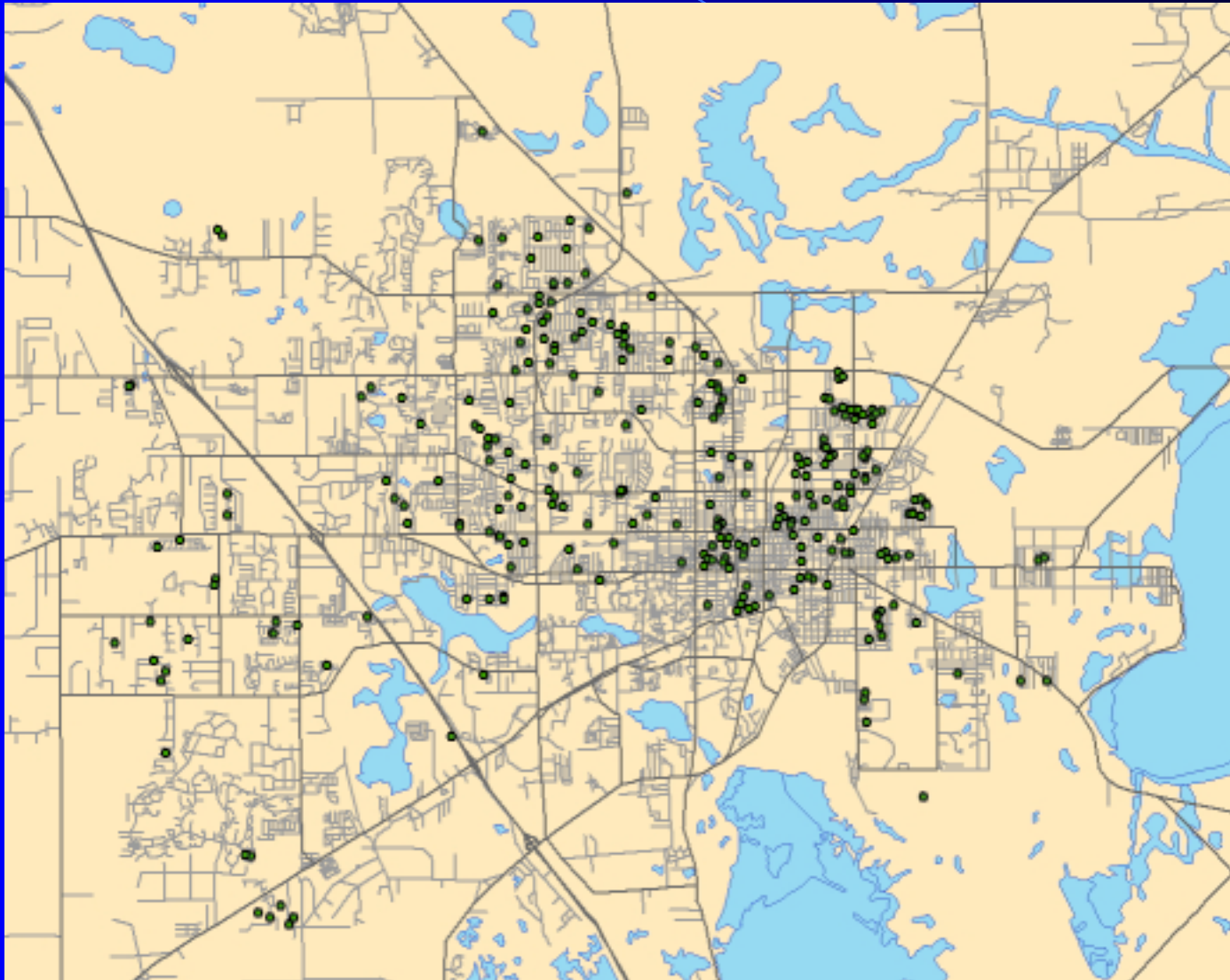
Gainesville Sample Sites

(300 randomized sites from 737 validated burglarized parcels)



Control Sites

294 match sites for 300 sample sites, 6 sample sites can not find match site with similar demographic and social-economic properties



Environmental Variables

- Urban Form Characteristic
 - Ratio of Adjacent Land Uses
 - Commercial (Rhodes and Conly, 1981)
 - Industrial (Shaw and McKay, 1929)
 - Vacant property (Perkins et al., 1992)
- Street Characteristic
 - Connectivity (permeability) (Taylor, 2002)
- Site Characteristics
 - Corner location (Kunz, 1986)
 - Relationship to parks and open space (Rengert and Hakim, 1998)

Environmental Variables

- Ratio of Adjacent Land Uses

Sum of specified land use parcels areas /sum of areas for all parcels that intersect with buffer area of studied site

- Commercial:

- Store: one story stores
- MixUse: store and office or store and residential or residential combination
- DepStore: Department Stores
- SupMar: Supermarkets
- Club: Nightclubs, cocktail lounges, bars

- Industrial:

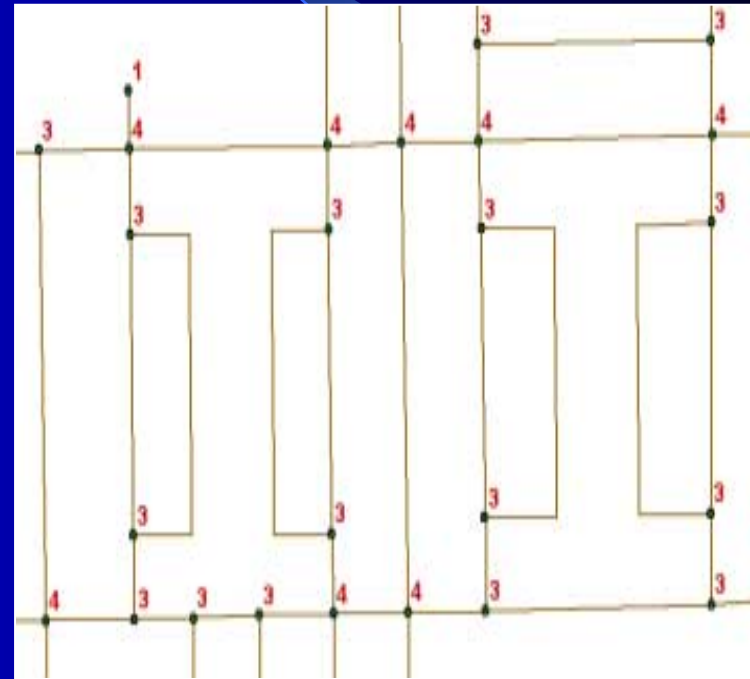
- Indust: Industrial

- Vacant Property:

- Vac: Vacant Residential, Vacant Commercial, Vacant Industrial, Vacant Institutional

Environment Variables

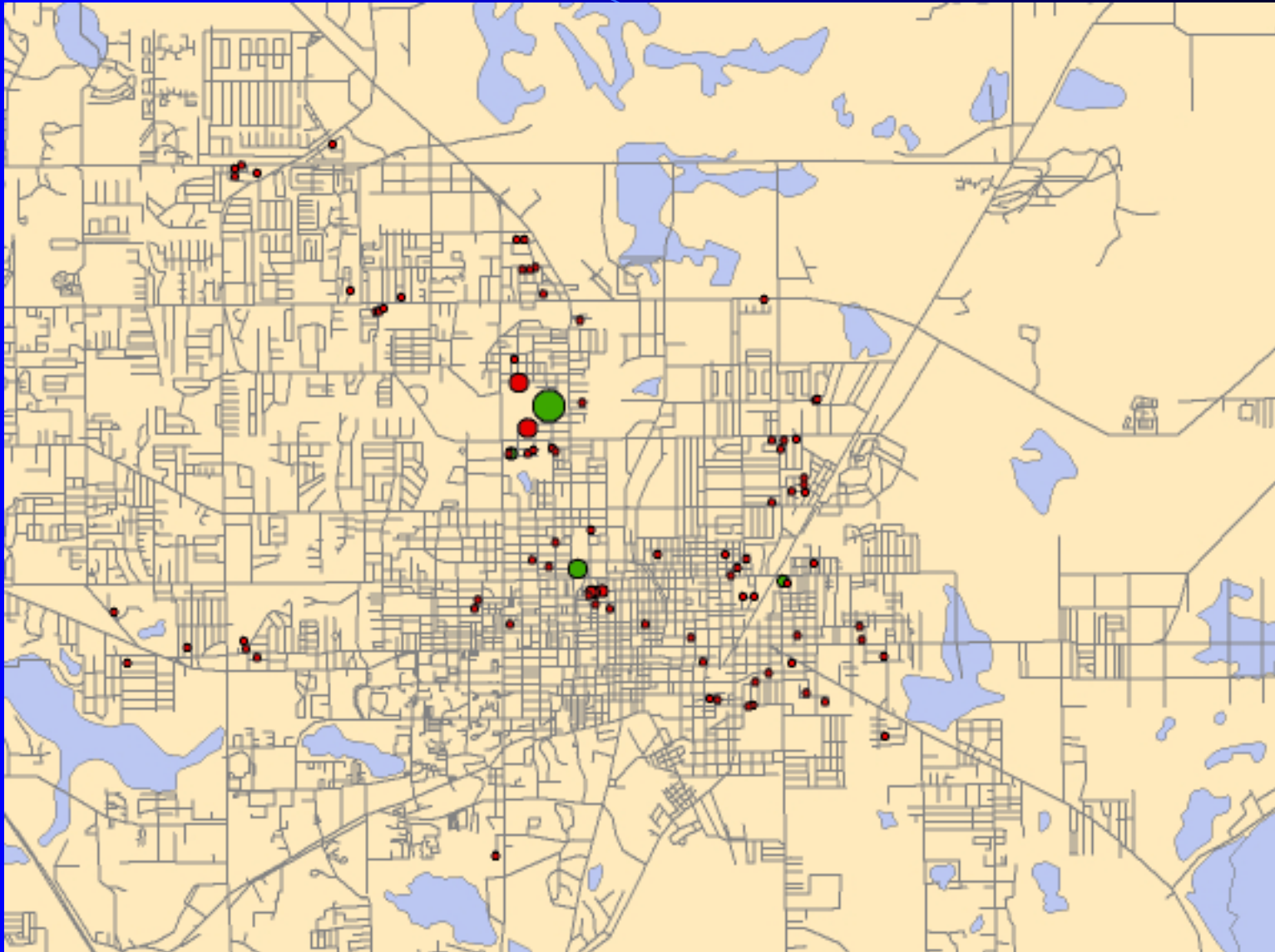
- Street Characteristic
 - Connectivity: the average number of connecting counts of segments for all intersections in the buffer area of studied site



Environment Variables

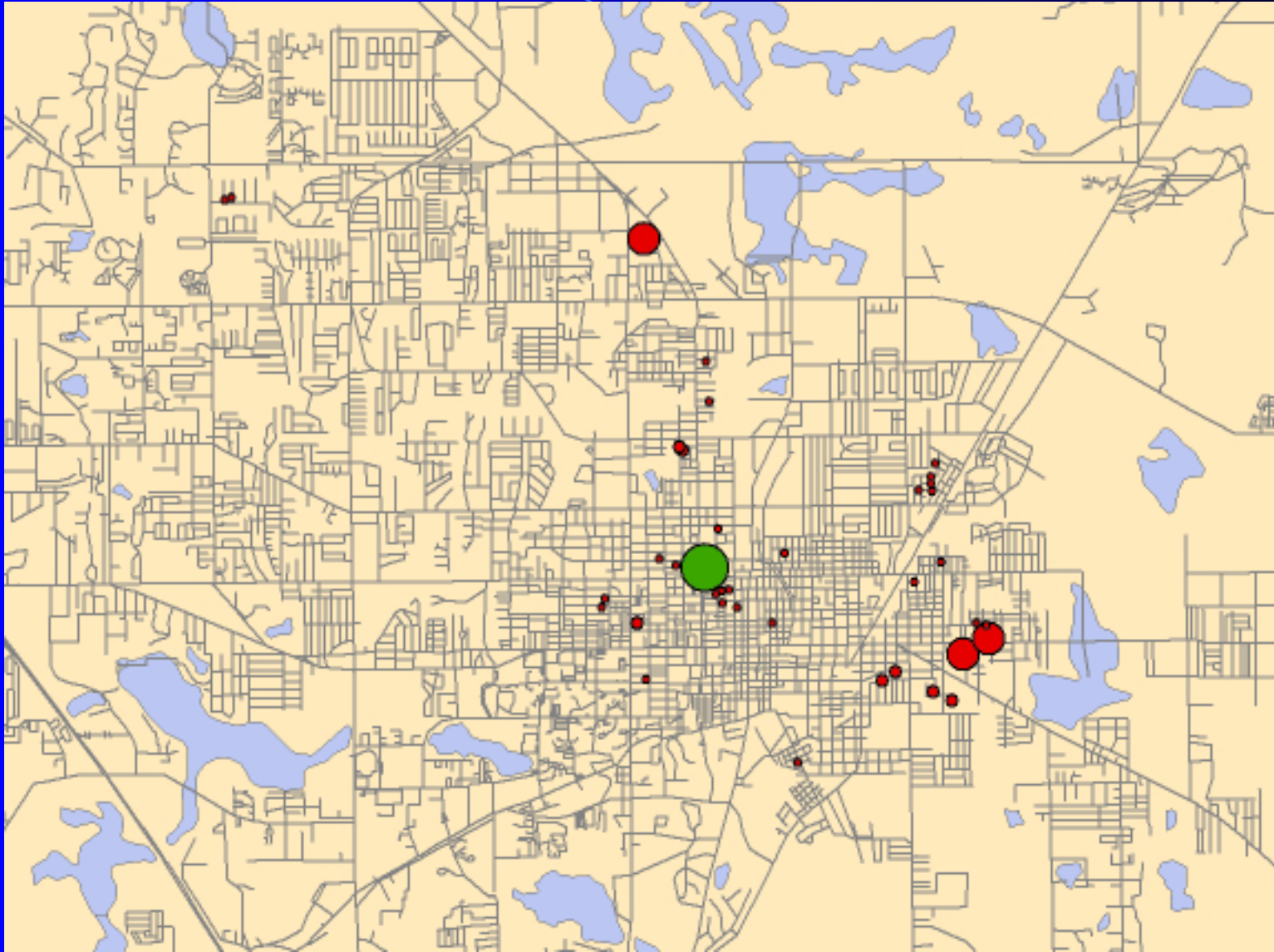
- Site Characteristic
 - Corner location: if the parcel is at block corner
 - Relationship to parks and open space: if the parcel is adjacent to forests, parks, recreational areas, parking lots, mobile home parks or agriculture

Analysis Results—Commercial, Store



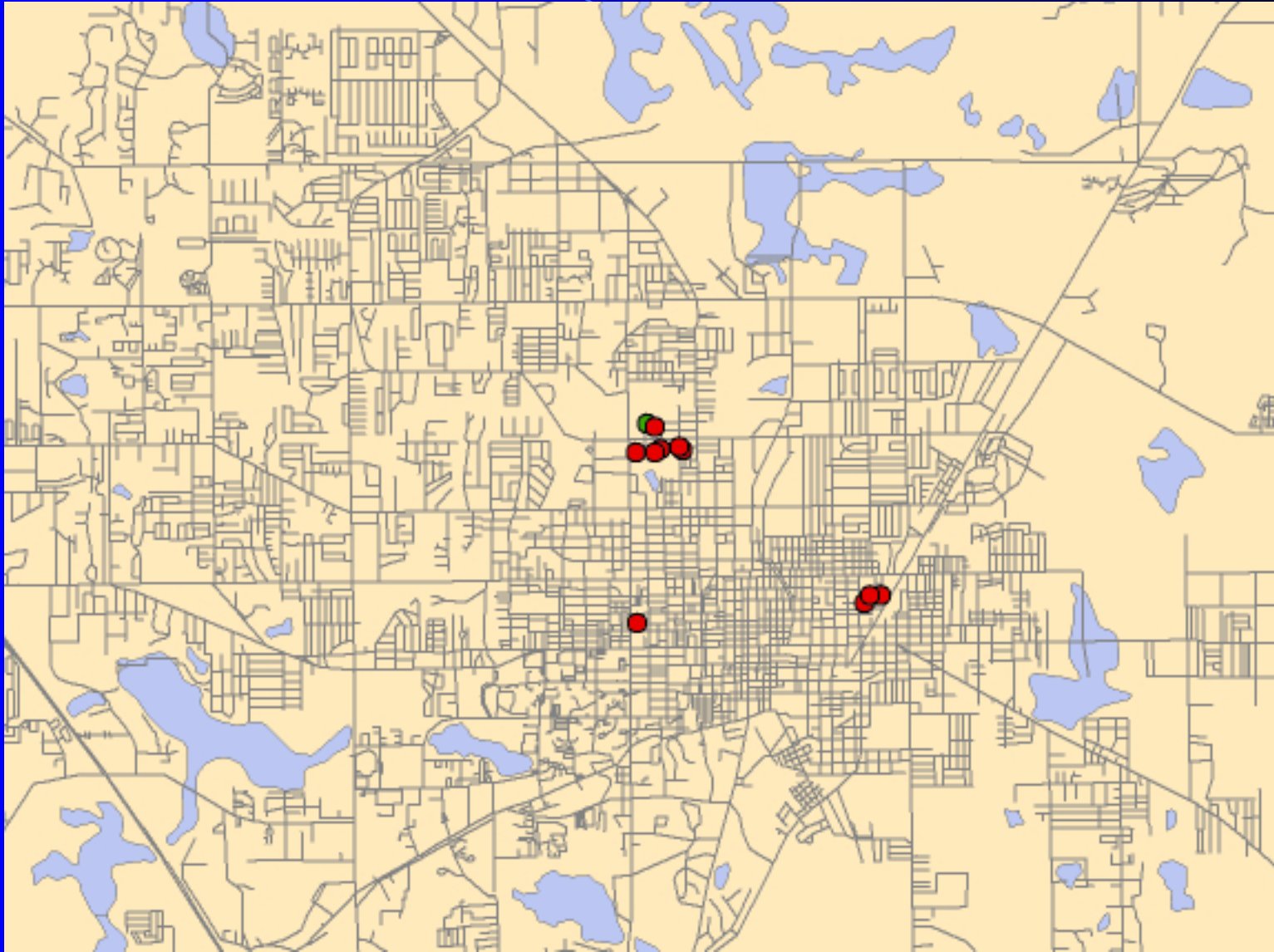
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results—Commercial, Mixed Use



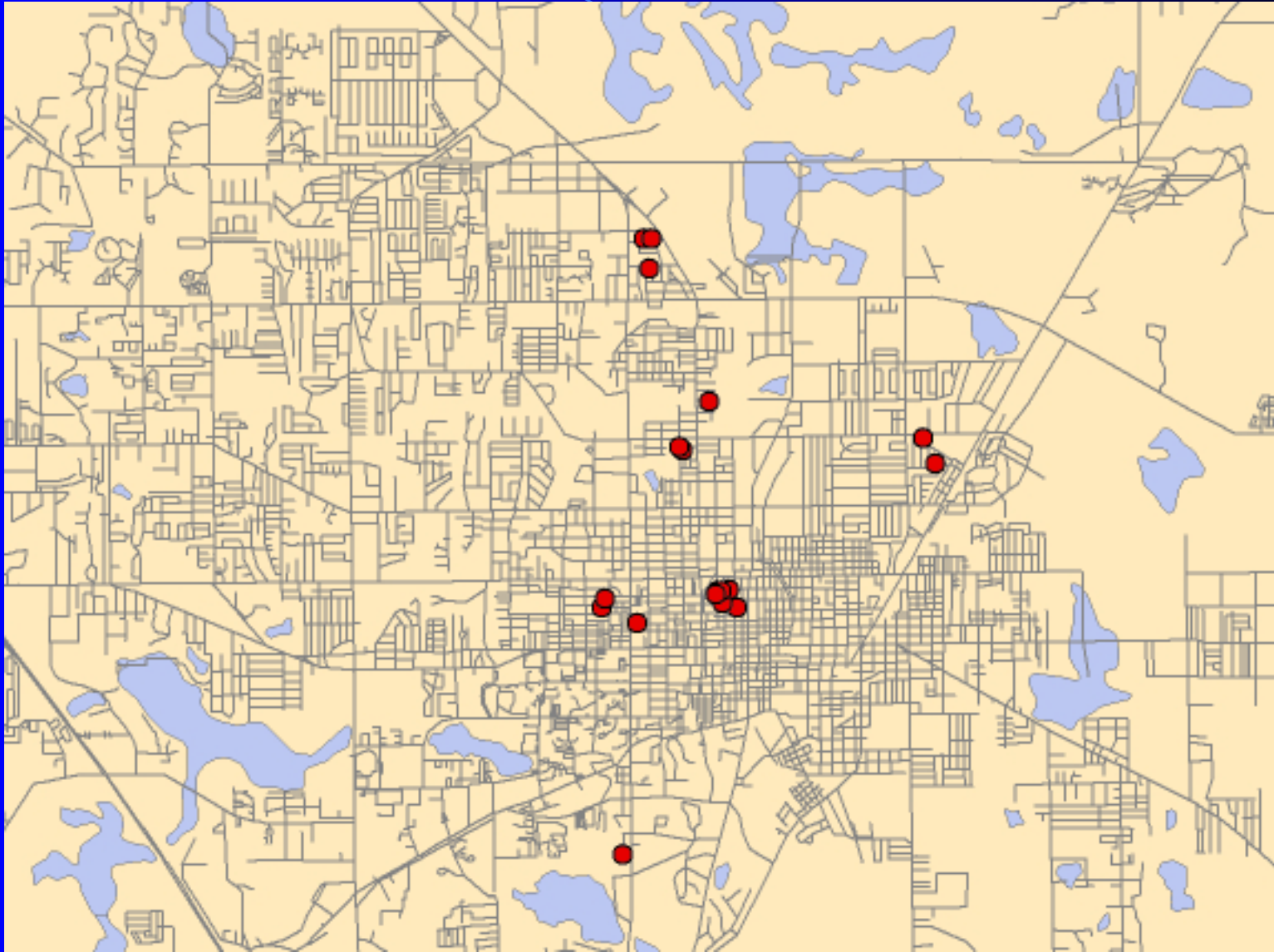
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results—Commercial, Super Market



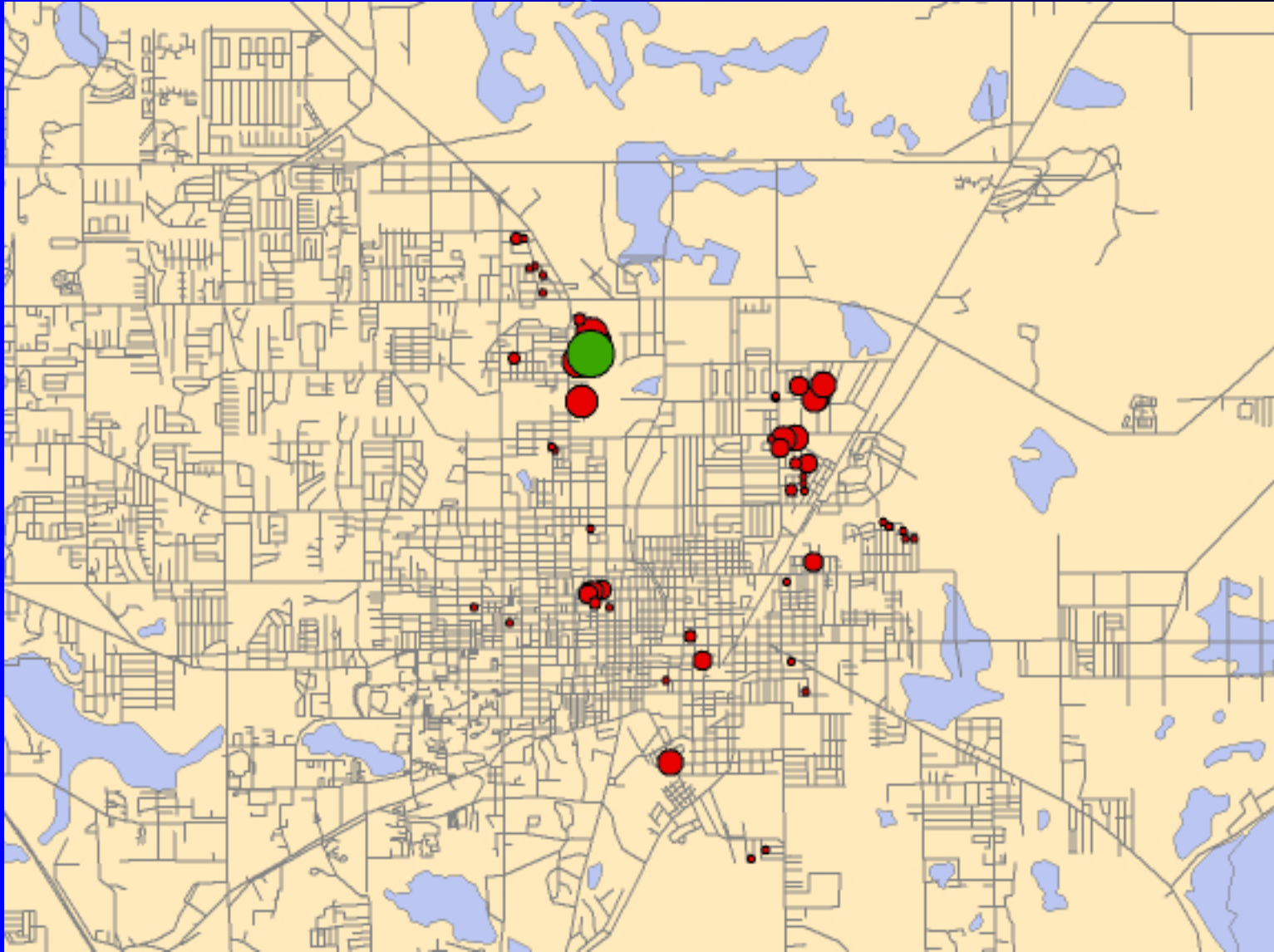
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results—Commercial, Club



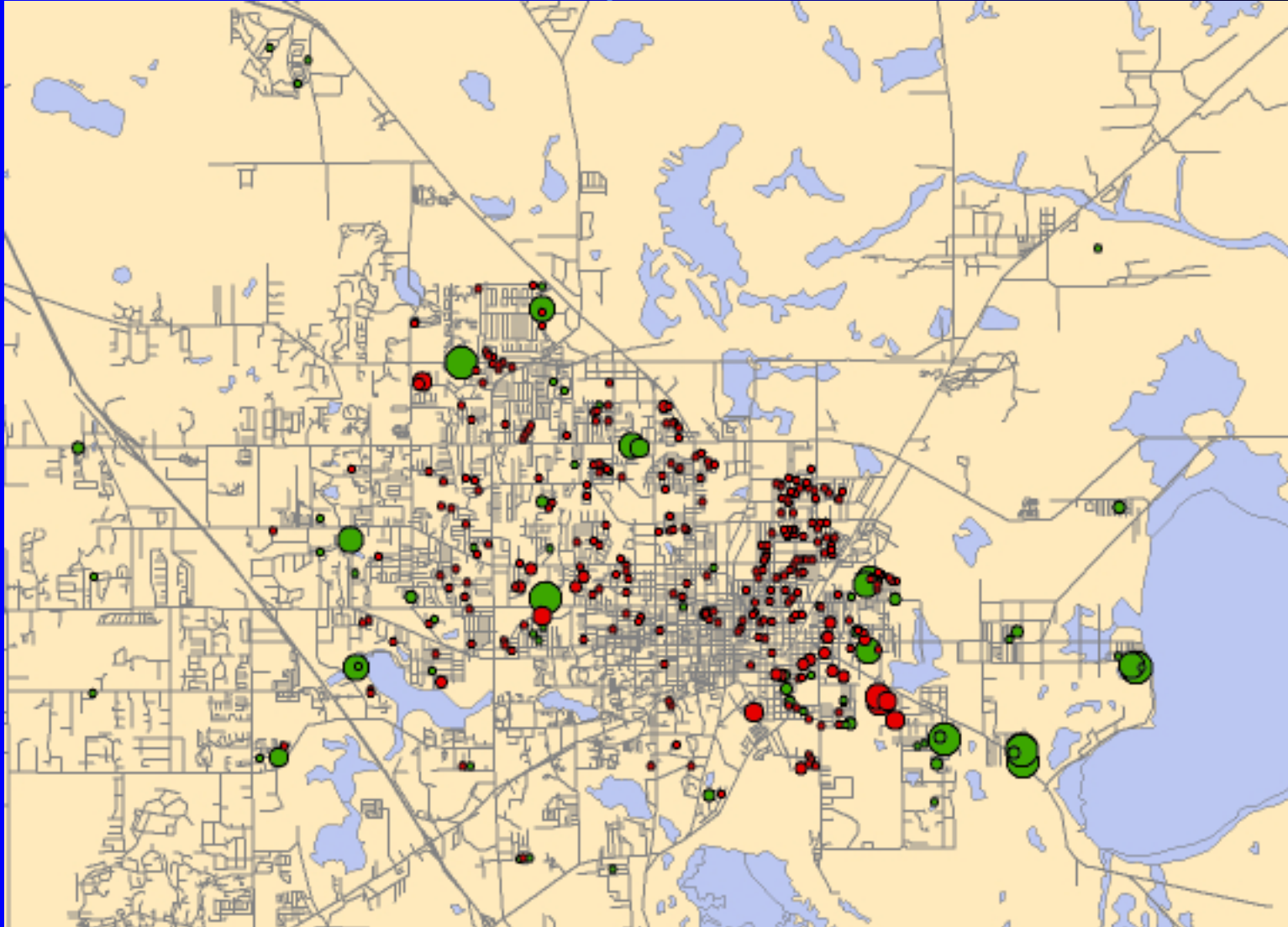
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results—Industrial



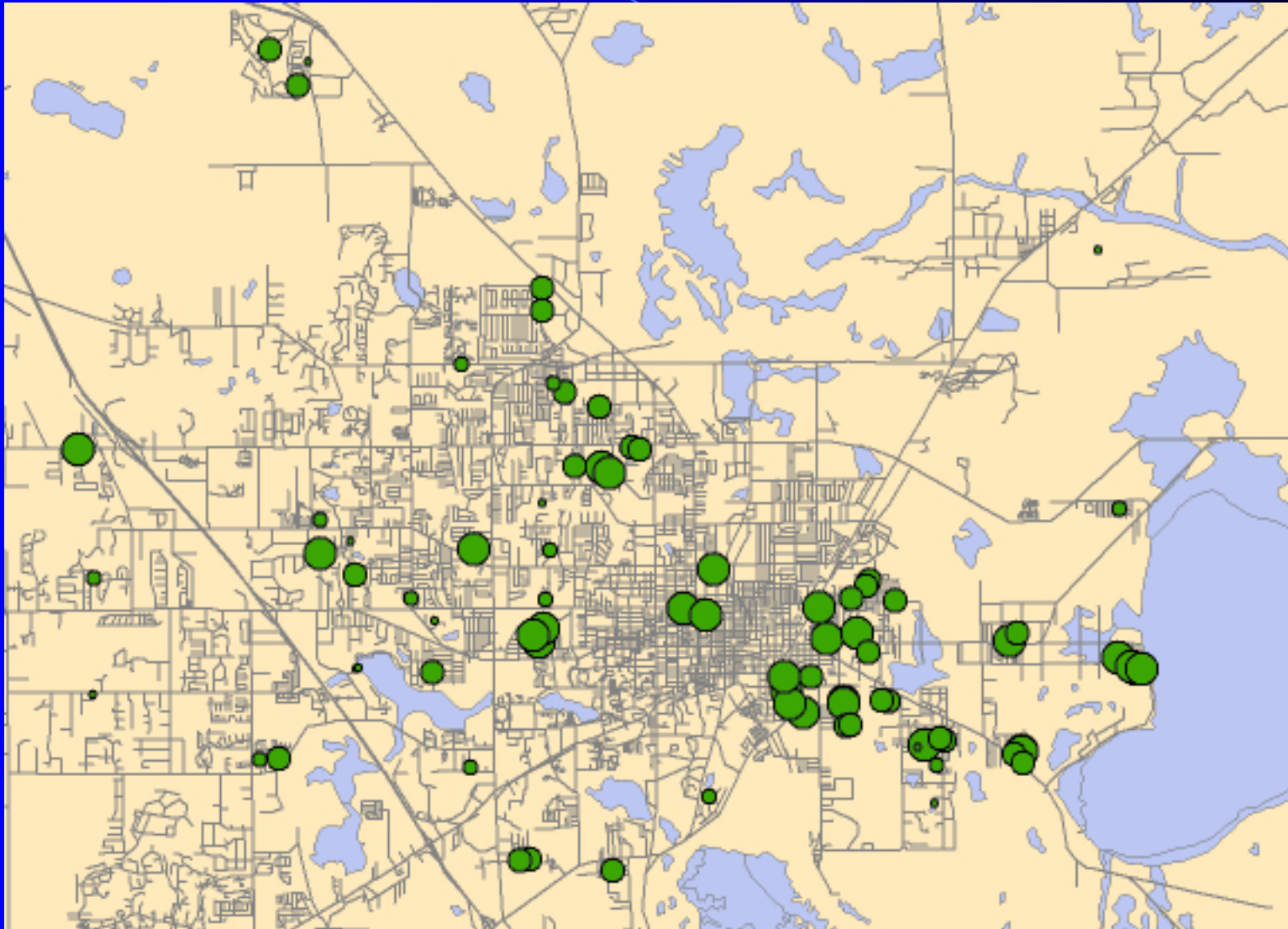
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results—Vacant Property



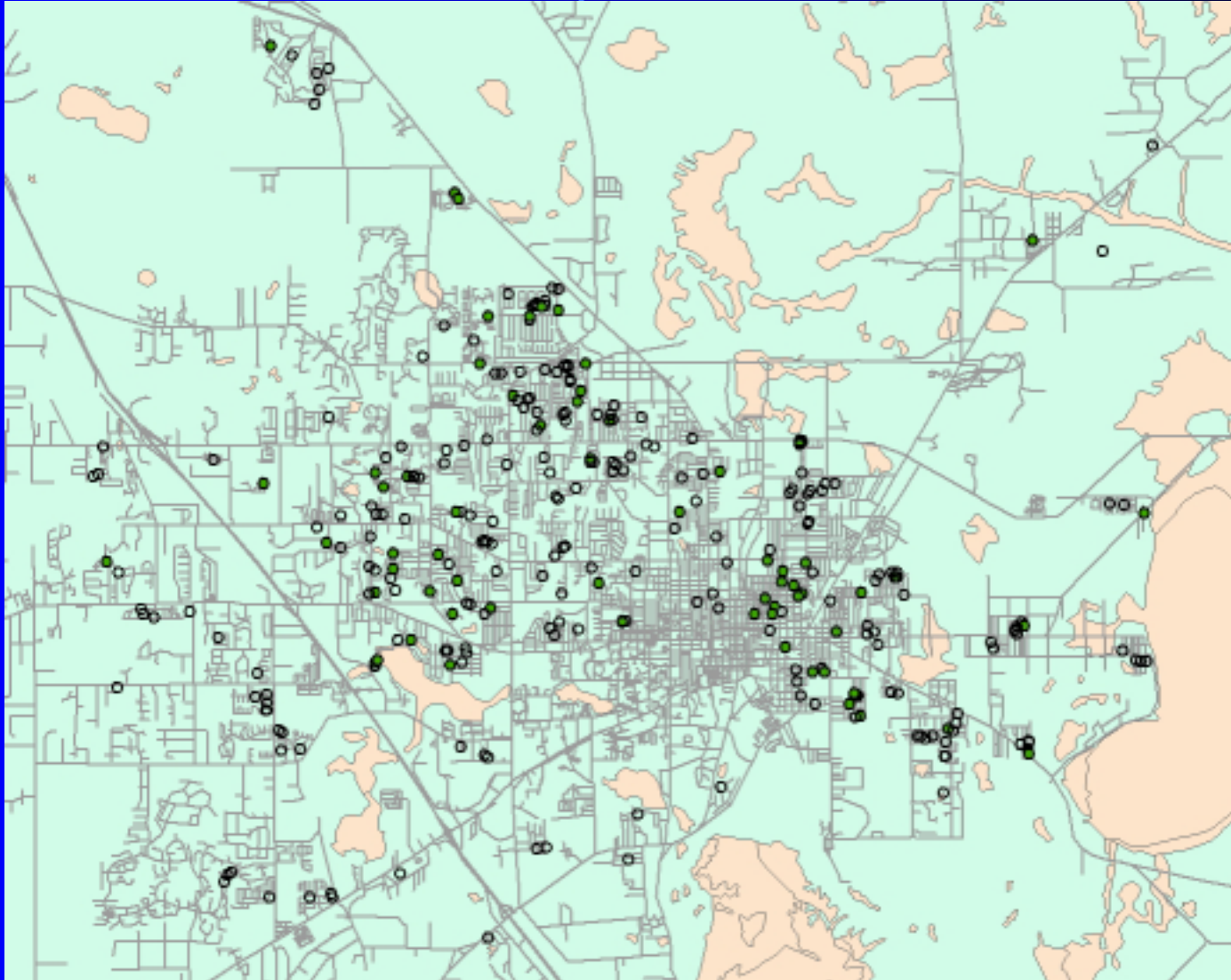
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results—Street Connectivity



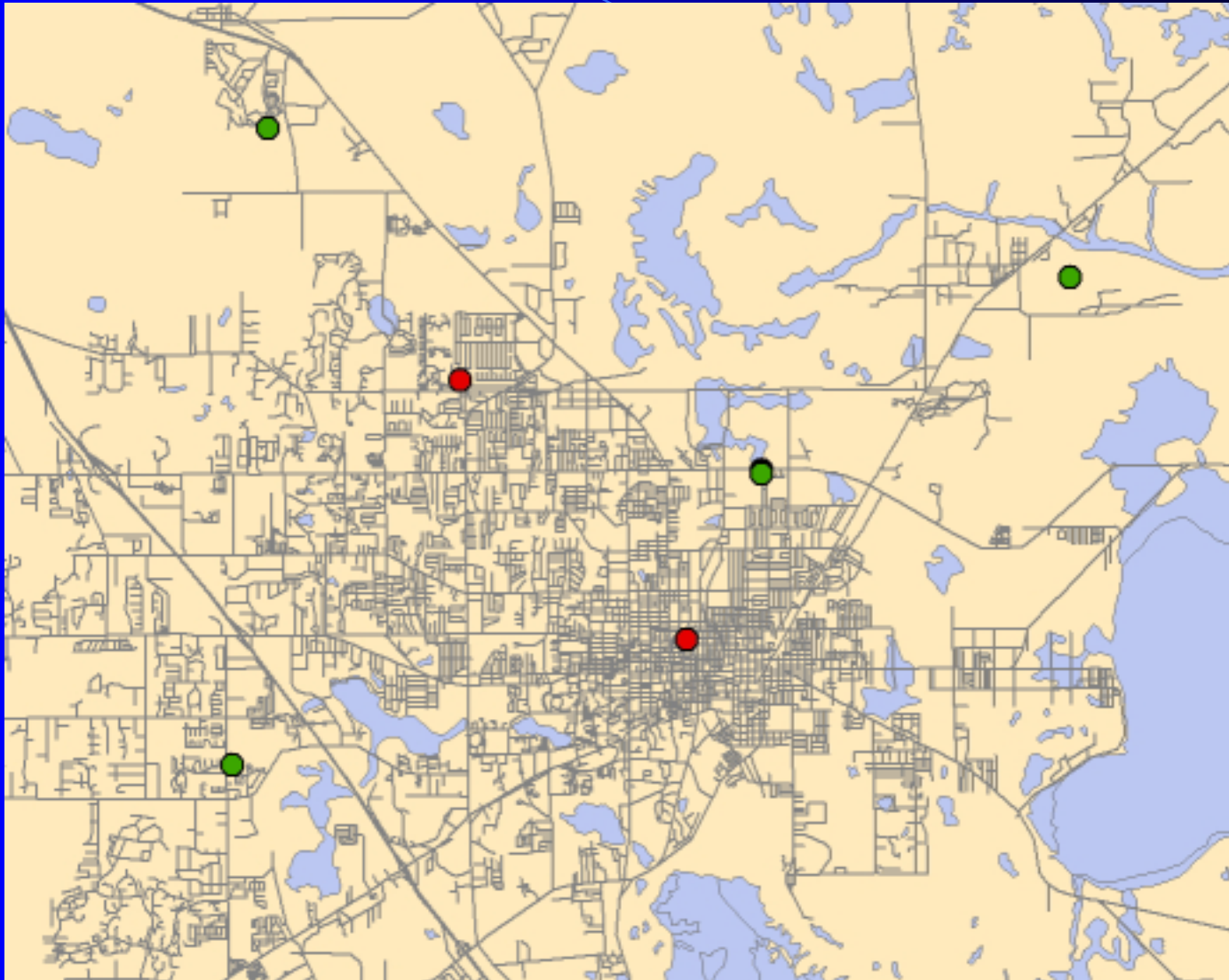
Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results— Corner



Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results— Open Space



Red represents sample cases, Green represents match cases, buffer distance is 500 feet

Analysis Results— Overall

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	vacres - vacres_1	.01963661541201	.22932371440493	.01337443082409	-.00688551393263	.04595874475665	1.468	293	.143
Pair 3	vacind - vacind_1	-.00351270791541	.03011839882219	.00175654069010	-.00696974414696	-.00005567168386	-2.000	293	.046
Pair 5	vac - vac_1	.016123907496599	.231994843671547	.013530214048477	-.010504818181677	.042752633174875	1.192	293	.234
Pair 7	store - store_1	-.00399551740503	.03459658503740	.00201771381392	-.00796656675159	-.00002446805848	-1.980	293	.049
Pair 8	mbuse - mbuse_1	-.00078864195861	.00970178737477	.00058581973003	-.00190222806467	.00032494414746	-1.394	293	.164
Pair 9	depstore - depstore_1	-.00018584270347	.00160269886364	.00009347129589	-.00036980294892	-.00000188245802	-1.988	293	.048
Pair 10	supmar - supmar_1	-.00046597278085	.01048737265064	.00061163599373	-.00166972957553	.00073778401383	-.762	293	.447
Pair 11	club - club_1	-.00074001271381	.00620245925555	.00036173476968	-.00145194054562	-.00002808488200	-2.046	293	.042
Pair 12	indust - indust_1	-.01102314653395	.06422585374115	.00374572785620	-.01839508900327	-.00365120406462	-2.943	293	.004
Pair 13	connectiv - connecti_1	-.220013603231294	1.150004724988272	.067069637571690	-.352012917809981	-.088014288852606	-3.280	293	.001
Pair 14	Open - Open1	.01361	.16468	.00960	-.00530	.03251	1.417	293	.158
Pair 15	Corner - Corner1	-.07483	.67346	.03344	-.14065	-.00901	-2.237	293	.026

Conclusions

- Controlling for certain socioeconomic and demographic characteristics, based on data from Gainesville, it is found that vacant industry, one story store, club, cocktail lounges, bars, industry, street connectivity and corner location are related with single family residential burglary in 95% confidence.